# REAL TIME DATA MONITORING & CONTROLLING BY USING IoT

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***ABSTRACT***: This real time data monitoring and controlling solution differs from the conventional solutions, as it incorporates an extended list of IoT devices with the typical industrial surveillance and data collection systems, offering a complete data monitoring and analysis platform. This project offers a powerful solution for industrial digitalization, allowing automated monitoring and control of production lines. Using wireless data collection stations, the system can monitor performance statistics of the produced batches, including production times, breakdowns, downtimes, losses and operational activity.

**IndexTerms - Monitoring, Controlling, Internet of Things (IoT), Real data monitoring**.

## I. INTRODUCTION

Building an electronic system that satisfies the legal requirements of industries has been a challenge for a long time. Graphics, statistics, and analytics tools are combined together, displaying the results both in real time as well keeping history of events for future analysis.

The main features of the IoT system includes a Continuous monitoring of the main KPIs of the plant and its machines in real time, Personalized alerts and alarms for all types of data with user-configurable limits. Able to display alerts in the graphical user interface as well as send pre-configured emails.

Local implementation of IoT, protecting the privacy of business data. Installation of the system does not affect the existing production flow and does not require any change in existing plant facilities. The system can be integrated on running productions with minimal integration overhead.

More specifically, intelligent IoT devices collect KPI data and send them over a wireless network to the central data collection & processing station.

In this IoT based system is use to mitigate the disadvantages system like SCADA & PLC, IoT based equipment monitoring and controlling offers a promising solution with a fully automated system ensuring a greater level of reliability, and thereby increase of the system performance with the efficient use of the equipment.

The interconnected devices are then connected using local networks, achieving the maximum level of protection during data transmission.

## II. RELATED WORK

The previous research papers show data monitoring of the different industrial machines like CNC machines, stator windings and other electrical machines. The main and only work this machine have, is of monitoring the status and other environmental parameters. So, monitoring these environmental parameters had only aim of maintenance of machines which was not even mobile monitoring. This computerized monitoring is stationary and was time consuming. The cost of all this system was also high. Other companies are also exploring the use of IoT for monitoring their facilities. Companies like Amazon, Boeing, Caterpillar, etc. are looking to utilize the power of cloud computing through IoT to cut operating and shipping costs, and increase warehouse and machine efficiency. The IoT based industrial monitoring systems work with sensors that detect vibration, temperature, torque and speed. Some of these sensors will be used in the current project.

This project is aiming for not only monitoring the data for maintenance of the machines but also controlling some of the parameters of the data to improve the machines performance. It also has the additional feature of giving alert for its total working duration to maintain the health of machines. The IoT implementation helps to reduce the overall system cost.

## III. WHY IOT SYSTEM IS USED?

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines that are provided with a unique identifier and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. The main aim of this work is to develop a fully automated IoT based associated equipment that can be protected, monitored and controlled from any place in the world only by the authorized personnel at a very low cost.

## IV. MONITORING OF SOME KEY PARAMETERS

To make the performance of the machines for efficient working and life-long service its some key parameters must be monitor regularly. Monitoring parameters directly related to machine capability such as speed, temperature, and its ON/OFF status, the capability of the machine tool can be determined from this above feature. By performing regular 'health checks' on machines and recording results, trends can be identified over time, allowing the industry to initiate maintenance interventions before a possible breakdown. This also can make the fault-finding process where the changes in parameters can grab your attention for systems working issues. After that these faults can be rapidly eliminated without wasting any time. so, this will help to save machine from going to dead arena.

## V. CONTROLLING, ALERT SYSTEM AND MOBILE APPLICATION

To observe the parameters for maintenance purpose is not enough. To make sure the given machine should fully assist for its best performance the controlling and alert system is introduced in this project. If the machine is working for more than a permitted time and temperature is rising enough than a normal limit its important to switch OFF the machine and keep it at rest position. For a person, who is monitoring the condition, to make this controlling easy task and grab his attention to the system controlling is done with mobile application. Only on one click a person can easily switch ON/OFF the machines as required. The application is highly secured and easy to handle. The mobile application will continuously get the data from machines without any fail. This makes system work in real time.

## VI. FEATURES

The system can be divided into three sub-systems:

1. **A machine's process monitoring system**
2. **A system for preventive maintenance of the machinery**
3. **A system for monitoring environmental parameters**

With this overall solution providing a complete system with below feature:

- **Temperature**
- **Speed**
- **Time Duration of running machine**
- **ON/OFF controlling**
- **Alerts**
- **Android application for easy sign ins and secure system**

## VII. HARDWARE SOLUTION

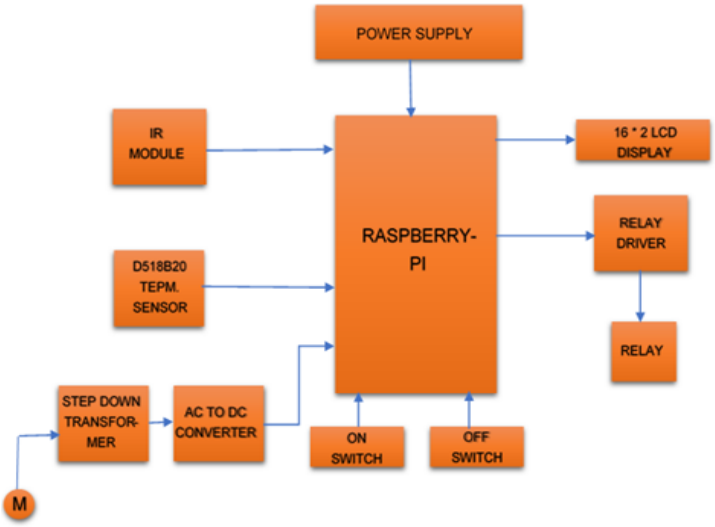


**Fig 1.** Hardware implementation of system

Input are taken from the control panels of individual machines for the hardware system. As the switches have AC supply of 230v we first convert it into 12v AC with the help of step-down transformer. This output 12v AC is then rectified by rectifier for DC output. This DC output is then fed to the Raspberry pi. The main function of raspberry pi is to encode data coming from previous hardware and transmit it to the server. Temperature sensor is required for temperature measurements which will be attach with the machines. LCD display is use to monitor the status of the overall circuitry.

## VIII. SOFTWARE SOLUTION

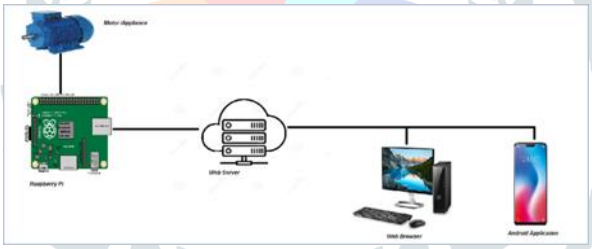

**Fig 2**. Transmitting data to web server

Raspberry Pi --> Sensor installation.

Although often pre-configured to operate as a headless computer, the Raspberry Pi may also optionally be operated with any generic USB computer keyboard and mouse. It may also be used with USB storage, USB to MIDI converters, and virtually any other device/component with USB capabilities, depending on the installed device drivers in the underlying operating system.

Other peripherals can be attached through the various pins and connectors on the surface of the Raspberry Pi.

Python Script is use for Generating the data from Motor and send data to the Cloud Raspberry Pi send the data via WI-FI to a remote web server. We can see all the data from anywhere in the world simply by visiting the web page and using android application. Final Outcome will be shown in the Web Browser and Android Application.

## IX. ADVANTAGES

- Tracking Stages of Machine in Real Time
- Automatic Reporting of Events
- Monitoring 24/7
- Location mapping

- Alerts and logging for reduced human error
- Increase production efficiency
- Statistical Analyses of collected data

## X. LIMITATIONS

- Internet connection is must.
- If the internet speed is varied considerably according to your location in relation to the network might be problematic for loading the data

## XI. APPLICATION

- Packages & Building Materials Industries
- Food, Beverage, Brewing Industries
- Automotive & Aviation Industries
- In school /college ‘s machine laboratory.
- Pharmaceutics Industries

## XII. CONCLUSION AND FUTUREWORK

In this paper, IoT based smart system has been developed for remote monitoring and controlling the equipment which is very reliable, user-friendly and low cost as compared to the conventional system. The proposed system is an absolutely automatic system that includes continuous sensing of temperature, speed, sending data to the web server, storing and displaying data in web page, and sending a comment to an internet module for performing the specific task such as initiating the operation.

The project team is also looking for monitoring and controlling of Vibration, Humidity, Noise Pollution, Luminosity, Air Quality & Particle Matter (Dust), Watt consumption. Also, team has planning to introduce alert system regarding to watt consumption which will help in future to keep an eye on power usage.

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